

What is Claimed Is:

1. An electronically reconfigurable battery, comprising:

A first plurality of battery modules;

A plurality of switches selectively interconnecting said plurality of battery modules, wherein a selectable number of said plurality of battery modules may be connected either in a series configuration or in a parallel configuration, as a result of placing selected switches of said plurality of switches in open states or closed states; and

An output switch connecting a first output terminal of said battery to a first load.

2. An electronically reconfigurable battery as set forth in claim 1, wherein each of said plurality of battery modules is associated with at least three of said plurality of switches, one of which connects said battery module in series with an adjacent battery module when closed, and the other two of which connect said battery module in parallel with an adjacent battery module when closed, such that when said one switch is closed, said other two switches are open, and when said switch is open, said other two switches are closed.

3. An electronically reconfigurable battery as set forth in claim 1, further comprising a second plurality of battery modules, each of said second plurality of battery modules being connected in parallel with each other, said first plurality of battery modules being selectively connected to said second plurality of battery modules through at least two of said plurality of switches.

4. An electronically reconfigurable battery as set forth in claim 3, wherein said second plurality of battery modules are connected to a second load at a second output terminal of said battery.
5. An electronically reconfigurable battery as set forth in claim 4, wherein said second load comprises a motor for propelling a vehicle or vessel.
6. An electronically reconfigurable battery as set forth in claim 5, wherein said first load comprises an electromagnetic armor system.
7. An electronically reconfigurable battery as set forth in claim 1, wherein said plurality of switches comprises a plurality of IGBT switches.
8. An electronically reconfigurable battery as set forth in claim 1, wherein said plurality of switches comprises a plurality of MOSFET switches.
9. An electronically reconfigurable battery as set forth in claim 7, wherein said plurality of IGBT switches are opto-isolated switches.
10. An electronically reconfigurable battery as set forth in claim 8, wherein said plurality of MOSFET switches are opto-isolated switches.
11. A hybrid electric vehicle, comprising:

a prime mover for providing a primary source of propulsion energy to a vehicle load;

an electronically reconfigurable battery for providing a secondary source of propulsion energy to said vehicle load, and for providing a source of energy for a short-term and/or pulsed load provided on said vehicle, said electronically reconfigurable battery comprising

a first plurality of battery modules;

a plurality of switches selectively interconnecting said plurality of battery modules, wherein a selectable number of said plurality of battery modules may be connected either in a series configuration or in a parallel configuration, as a result of placing selected switches of said plurality of switches in open states or closed states;

an output switch connecting a first output terminal of said battery to said short-term and/or pulsed load; and

a second output terminal of said battery being connected to said vehicle load.

12. A hybrid electric vehicle as set forth in claim 11, wherein each of said plurality of battery modules is associated with at least three of said plurality of switches, one of which connects said battery module in series with an adjacent battery module when closed, and the other two of which connect said battery module in parallel with an adjacent battery module when closed, such that when said one switch is closed, said other two switches are open, and when said switch is open, said other two switches are closed.

13. A hybrid electric vehicle as set forth in claim 11, further comprising a second plurality of battery modules, each of said second plurality of battery modules being connected in parallel with each other, said first plurality of battery modules being selectively connected to said second plurality of battery modules through at least two of said plurality of switches.

14. A hybrid electric vehicle as set forth in claim 11, wherein said vehicle load comprises a motor for propelling said vehicle.

15. A hybrid electric vehicle as set forth in claim 11, wherein said short-term and/or pulsed load comprises an electromagnetic armor system for said vehicle.

16. A hybrid electric vehicle as set forth in claim 11, wherein said plurality of switches comprises a plurality of IGBT switches.

17. A hybrid electric vehicle as set forth in claim 11, wherein said plurality of switches comprises a plurality of MOSFET switches.

18. A hybrid electric vehicle as set forth in claim 16, wherein said plurality of IGBT switches are opto-isolated switches.

19. A hybrid electric vehicle as set forth in claim 17, wherein said plurality of MOSFET switches are opto-isolated switches.

20. An electronically reconfigurable battery as set forth in claim 1, wherein said battery can be reconfigured to match a hybrid vehicle with a variable DC main bus voltage used for parade/standby level reliability and that can reconfigure to shorter life higher power combat mode.

21. An electronically reconfigurable battery as described in claim 1, wherein DC current is limited by selection of electrochemical discharge characteristics of the selected battery technology.

22. An electronically reconfigurable battery as described in claim 1, further comprising a series current limiting device, network or system inserted in circuit with the fully erected battery so as to limit DC current.

23. An electronically reconfigurable battery as described in claim 1, further comprising a series current limiting device, network or system inserted in circuit with the partially or sequential erected battery so as to limit DC current.

24. An electronically reconfigurable battery as described in claim 23, wherein said charge current limiting device comprises a single stage converter (SSC) whose output voltage is limited to approximately the battery module voltage level.
25. An electronically reconfigurable battery as described in claim 24, wherein a bypass switch is used to connect the input to the output of the SSC circuit to directly connect the dynamic store portion of the battery with the static portion of the battery .
26. An electronically reconfigurable battery as described in claim 22, wherein said current limiting device, network or system consists of a resistive or inductive component in a RC or LC current limiting circuit.
27. An electronically reconfigurable battery as described in claim 23, where the current limiting device, network or system consists of a resistive or inductive component in a RC or LC current limiting circuit.
28. An electronically reconfigurable battery as described in claim 24, wherein the SSC is an electronic DC-DC converter whose input circuit is connected to the static portion of the battery and whose output is connected to the first stage of the dynamic section of the battery.
29. An electronically reconfigurable battery as described in claim 24, wherein the SSC is an electronic DC-DC converter whose input circuit is connected to a suitable DC source other than the static portion of the

battery and the output is connected to the first stage of the dynamic section of the battery.

30. An electronically reconfigurable battery as described in claim 24, wherein the SSC is an electronic converter whose circuit topology is chosen from the group of Buck, Boost, Buck/Boost, step-up, step-down, resonant, isolated, non-isolated, cyclo-converter, or matrix converter.

31. An electronically reconfigurable battery as described in claim 24, wherein the SSC is an electronic AC-DC converter whose input circuit is connected to a suitable AC source and whose output is connected to the first stage of the dynamic section of the battery.

32. An electronically reconfigurable battery as described in claim 1, wherein said battery is adapted for use in high to extreme peak to average power output pulsed power applications and platforms for non vehicular applications such as Electric Cannons, ETC guns, pulsed lasers, EM Jammers, RF, microwave, x-ray sources and man pack systems.